STATUS OF THE CLAIMS

Claims 1-45 were originally filed in this patent application. In response to the first office action, an amendment was filed on 07/17/2007 that cancelled claims 2, 7, 12, 17-18, 20, 24, 28, 32-33, 35-37 and 42-45, and amended claims 1, 6, 11, 16, 19, 23, 27, 31, 34 and 41. In the pending final office action, claims 1, 3-6, 8-11, 13-16, 19, 21-23, 25-27, 29-31, 34 and 38-41 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,530,078 to Shmid *et al.* (hereinafter "Shmid"). No claim was allowed. No claim has been amended herein. Claims 1, 3-6, 8-11, 13-16, 19, 21-23, 25-27, 29-31, 34 and 38-41 are currently pending.

REMARKS

Rejection of claims 1, 3-6, 8-11, 13-16, 19, 21-23, 25-27, 29-31, 34 and 38-41 under 35 U.S.C. §103(a)

In the pending office action the examiner states that claims 2, 7, 12, 18, 20, 24, 28, 32, 37, and 45 are rejected under 35 U.S.C. §103(a). These claims were cancelled in the amendment in response to the first office action, so the examiner's statement is in error. However, the body of the rejection addresses claims 1, 3-6, 8-11, 13-16, 19, 21-23, 25-27, 29-31, 34 and 38-41. It is therefore assumed that the examiner meant to reject claims 1, 3-6, 8-11, 13-16, 19, 21-23, 25-27, 29-31, 34 and 38-41 under 35 U.S.C. §103(a) as being unpatentable over Shmid. Each of these claims is addressed below.

Claim 1

In rejecting claim 1, the examiner states that Shmid discloses:

> (D2) a virtual device driver in the second logical partition, wherein the virtual device driver provides a set of functions at least partially determined by functions available in the I/O adapter device driver in the first logical partition.

The language of limitation (D2) recited in the rejection is language that is no longer in claim 1 due to the previously-filed amendment. Because the examiner's rejection addresses claim language that is no longer in claim 1, the examiner's rejection of claim 1 is in error.

In rejecting the limitations of claim 1, the examiner states,

> It would have been obvious to one of ordinary skill in the art that Shmid impliedly teaches the querying of the I/O adapter device to determine the available functions. Since the guest is given access to all functions available via the host operations system through the virtualized

> device (Col. 9, lines 4-48), the virtualized device and its driver must have access to all functions of the real device in order to make those functions available to guest operating systems.

The examiner makes the assumption that because the virtualized device must have the functions of the real device, that the real device must have been queried to obtain those functions. This is an erroneous assumption. Nowhere does Shmid teach or suggest "querying the I/O adapter device driver in the first logical partition for its available functions" as recited in claim 1. For this reason alone, claim 1 is allowable.

In an attempt to justify the assumption that Shmid impliedly teaches the querying of the I/O adapter device to determine its available functions, the examiner states:

> Also, Shmid discloses that the virtual machine (VM), upon which the guest operating system runs within the host, is capable of querying for the features of a device in the system for the purpose of configuring the VM (Col. 36, lines 65-67 and col. 37, lines 20-33).

The examiner's statement is incorrect. Shmid teaches at col. 37 line 30 "024–query device and type features." There is no explanation in Shmid regarding the location of the device being queried. The examiner assumes without any express teaching in Shmid that the querying of device and type features in Shmid reads on querying the I/O adapter device driver in the first logical partition for its available functions, which at least partially determine a set of functions provided in the virtual device driver in a second logical partition. Claim 1 recites interaction between two logical partitions that is not accounted for in the examiner's rejection.

To determine the reasonable scope of the teaching "024–query device and type features" in Shmid, we must look to the other teachings in Shmid that provide a context that allow inferring what this line means. The Abstract of Shmid states:

> Each guest system is configured such that if a Start Interpretive Execution instruction in invoked, the instruction is interpreted and a corresponding

> function is performed in its place to simulate, for the guest program or operating system, the effect of the IBM S/390 computer architecture. Control is then returned to the guest system at the next instruction after the Start Interpretive Execution instruction, thus allowing the guest program or operating system to execute transparently.

The goal of Shmid is therefore to create an environment where a guest program or operating system in the guest system executes without knowing it is in a virtual machine. This is what is meant by "thus allowing the quest program or operating system to execute transparently." The presence of the host operating system is hidden from the guest operating system or program. For all practical purposes, the guest operating system or program thinks it is operating on an IBM S/390 computer system. Because the guest operating system or application thinks it is operating on an IBM S/390 computer system, there cannot be any special code or information in the guest system that tells the guest operating system or application there is a host system inside which the guest system is executing in a virtual manner. As a result, the examiner's assumption that a virtual device driver in the guest system can query an I/O adapter device driver in the host system for its available functions is in error. This would violate the transparency expressly taught by Shmid. This would require the guest system have knowledge of the host system, which it does not.

So how does Shmid handle an I/O request from a guest operating system or program to a physical I/O adapter? Col. 5 lines 42-49 state:

> When an I/O operation or a special CPU function is requested by the guest system the SIE instruction is intercepted and ISX receives control to the point just after the SIE instruction. ISX recognizes the reason for the interception and performs the corresponding function. If an I/O operation is requested with a real I/O device, ISX requests the host operating system to execute it using its standard facilities.

This shows once again that the guest system is oblivious to the fact it is running inside a host system. Because the guest system in Shmid has no knowledge it is

operating within a host system, the guest system has no direct interaction with the host system. Instead, the host system intercepts instructions and simulates them for the guest system to make it appear to the guest system the guest system is running on an IBM S/390 computer system. This shows conclusively that it is impossible for a virtual device driver in a guest system to query an I/O adapter device driver in the host system, as suggested by the examiner.

The examiner correctly states the virtualized device and its driver must have access to all functions of the real device in order to make those functions available to guest operating systems. However, the examiner's assumption that this necessarily means the I/O adapter device driver in the host system is queried to determine its functions is not supported in Shmid. To the contrary, the virtual walls erected to maintain the appearance of an IBM S/390 computer system from the guest system perspective do not allow a virtual device driver in the guest system to query an I/O adapter device driver in the host system. For this reason, the examiner's assumption is in error.

Applicant in the previous amendment provided many different ways the guest system could be made aware of all of the functions of the I/O adapter device driver without violating the virtual separation between the guest system and the host system. For example, let's assume an I/O adapter device driver in the host includes functions A, B, C and D. The examiner assumes this necessarily means the I/O adapter device driver must be queried to determine these functions. However, there are many possibilities other than querying the I/O adapter device driver. For example, a programmer could look at a specification sheet for the I/O adapter device driver that indicates the driver includes functions A, B, C and D, and could then program those functions directly into the virtual device driver. A system administrator may determine from a web site the I/O adapter device driver includes functions A, B, C and D, and could program a table that may be accessed

by the virtual device driver. A copy of the I/O device driver could be included in the guest system. There are countless different ways a virtual device driver could be programmed with or could receive functions of the I/O adapter device driver without querying the I/O adapter device driver. These simple examples above show conclusively that the examiner's assertion that Shmid somehow impliedly teaches the querying of the I/O adapter device driver to determine the available functions is incorrect, especially when this assumption goes against the other express teachings of Shmid as shown in detail above.

In the Response to Arguments section of the pending office action, the examiner justifies the rejection by stating:

> As is clearly stated on col. 37, lines 21-30, the guest is capable of querying a device and its feature using the diagnose command. As clearly stated in col. 14, lines 11-65, devices are directly assigned to guests within the system using the ATTACH command, either during the initialization of the guest or by an administrator issuing the command at a command console. Therefore, a device that is directly assigned to a guest can be queried for its features, thereby meeting the claim limitation.

The examiner assumes that when an I/O device in Shmid is directly assigned to guests within the system using the ATTACH command, the I/O device can then be queried for its features. This is not supported by the express language in Shmid, which explains in detail how an I/O operation by the guest system is processed.

> When an I/O operation or a special CPU function is requested by the guest system the SIE instruction is intercepted and ISX receives control to the point just after the SIE instruction. ISX recognizes the reason for the interception and performs the corresponding function. If an I/O operation is requested with a real I/O device, ISX requests the host operating system to execute it using its standard facilities. Shmid at col. 5 lines 42-49

This language makes it very clear that when an I/O operation for a real I/O device is requested in the SIE instruction, ISX requests the host operating system to execute the

request using its standard facilities. This means the wall of separation between the guest system and host system is maintained. The fact that an I/O device is attached to a guest system does not mean the guest system may then communicate directly with the I/O device to query its available functions. The language quoted above from Shmid shows just the opposite is true: when the guest operating system or program requests an I/O operation with a real I/O device, the request is intercepted, and the host operating system is requested to execute the request using its standard facilities. This shows conclusively that no direct interaction between a virtual I/O adapter in the guest system and the I/O adapter device driver in the host system is possible. Nowhere does Shmid support the examiner's assumption that a virtual device driver in a guest system can query the I/O adapter device driver in the host system.

For the many reasons given above claim 1 is allowable over Shmid, and applicants respectfully request reconsideration of the examiner's rejection of claim 1 under 35 U.S.C. §103(a).

Claims 6, 11, 19, 23, 27 and 34

Independent claims 6, 11, 19, 23, 27 and 34 include limitations similar to those in claim 1 addressed above, and are therefore allowable for the same reasons. Reconsideration is respectfully requested.

Claims 3, 8, 13, 16, 21, 25, 29, 31, 38 and 41

In the rejection of claim 3, the examiner provided no express mapping of any specific features of Shmid on the express limitations of claim 3. The examiner simply claims that the device to the guest system is controlled by the main operating system without indicating the relevance of these teachings to the limitations in claim 3. For this reason, the examiner has failed to establish a prima facie case of obviousness for these claims under 35 U.S.C. §103(a).

In addition, the examiner's assumptions are erroneous. Nowhere does Shmid teach or suggest "a transfer mechanism that transfers data between the virtual device driver and the shared network I/O adapter without the data passing through the I/O adapter device driver" as claimed in claim 3.

In the rejection of claim 1, the examiner states Shmid teaches:

> (D1) an I/O adapter device driver in the first logical partition, the I/O adapter device driver including a hardware interface to the shared network I/O adapter (citations omitted). All devices in a computer inherently require a device driver; therefore, the use of a network adapter, a device within the computer, meets this limitation.

So by the examiner's own language in the rejection of claim 1, the examiner insists the use of a network adapter requires a device driver. If this is true, this undermines the examiner's rejection of claim 3.

In the Response to Arguments section of the pending office action, the examiner states:

> Hardware devices are directly allocated to guest devices. Since the device driver executing on the guest is executing on a virtual machine, the driver constitutes a virtual device driver. Since the actual allocation step of the device to the guest system is controlled by the main operating system, the device is under the control of the main operating system.

It is unclear how the examiner's language relates to the limitations in claim 3, because the examiner's own characterization of Shmid expressly teaches away from the limitations in claim 3. As discussed in detail above with respect to claim 3, any I/O request for a real device is handled by the host operating system "using its standard facilities." Col. 5 line 49. The standard facilities in the host operating system include an I/O adapter device driver, as stated by the examiner in the rejection of claim 1 when the examiner stated: "All devices in a computer inherently require a device driver; therefore, the use of a

network adapter, a device within the computer, meets this limitation." This means according to the express teachings of Shmid, any request by a virtual device driver in a guest system must pass through the I/O adapter device driver in the host system. This is the prior art as shown in applicant's FIG. 3. Claim 3, in contrast, recites a transfer mechanism that transfers data between the virtual device driver in the second logical partition and the shared network I/O adapter in the first logical partition without the data passing through the I/O adapter device driver in the first logical partition, as shown in applicants' FIG. 5. Because an I/O request by a virtual device driver in a guest system is always handled "using standard facilities" in the host system, which includes by the examiner's own admission an I/O adapter device driver, all the data in Shmid necessarily passes from the virtual device driver, through the I/O adapter device driver, to the I/O adapter, as shown in applicant's FIG. 3. This expressly teaches away from "without the data passing through the I/O adapter device driver" as expressly recited in claim 3.

Claims 8, 13, 16, 21, 25, 29, 31, 38 and 41 include limitations similar to those in claim 3 discussed above, and are therefore allowable for the same reasons. Applicants respectfully request reconsideration of the examiner's rejection of claims 3, 8, 13, 16, 21, 25, 29, 31, 38 and 41 under 35 U.S.C. §103(a).

Claims 4-5, 9-10, 14-15, 22, 26, 30, and 39-40

Each of claims 4-5, 9-10, 14-15, 17-18, 22, 26, 30, and 39-40 depend on an independent claim that is allowable for the reasons given above. As a result, all of claims 4-5, 9-10, 14-15, 22, 26, 30, and 39-40 are allowable as depending on allowable independent claims.

Conclusion

In summary, none of the cited prior art, either alone or in combination, teach, support, or suggest the unique combination of features in applicants' claims presently on file. Therefore, applicants respectfully assert that all of applicants' claims are allowable. Such allowance at an early date is respectfully requested. The Examiner is invited to telephone the undersigned if this would in any way advance the prosecution of this case.

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